

TABLE 11.2

General Characteristics of Casting Processes

Typical materials cast	Sand All	Shell All	Evaporative pattern All	Plaster Nonferrous At, Mg, Zn, Cu)	Investment All	Permanent mold All	Die Nonferrous (Al, Mg, Zn, Cu)	Centrifuga All ¹
Weight (kg):								
Minimum	0.01	0.01	0.01	0.01	0.001	0.1	<0.01	0.01
Maximum	No limit	100+	100+	50+	100+	300	50	5000+
Typical surface finish (R, in porosity ¹)	5-25 3-5	1-3 4-5	5-25 3-5	1-2 4-5	0.3-2 5	2-6 2-3	1-2 1-3	2-10 1-2
Shape complexity	1-2	2-3	1-2	1-2	1	2-3	3-4	3-4
Dimensional accuracy ¹	3	2	3	2	1	1	1	3
Section thickness (mm):								
Minimum	3	2	2	1	1	2	0.5	2
Maximum	No limit	-	-	-	75	50	12	100
Typical dimensional tolerance (mm)	1.6-4 mm (0.25 mm for small parts)	f0.003		+0.005 - 0.010	+0.005	f0.01.5	f0.001 - 0.005	0.01_S
Equipment	3-5	3	2-3	3-5	3-5	2	1	1
Pattern/die	3-5	2-3	2-3	3-5	2-3	2	1	1
Labor	1-3	3	3	1-2	1-2	3	5	5
Typical lead time -'	Days	Weeks	Weeks	Days	Weeks	Weeks	Weeks to months	Months
	1-20	5-50	1-20	1-10	1-1000	5-50	2-200	7-1000
Typical production rate ^z (parts/mold-hour)								
Minimum quantity'	1	100	500	10	10	1000	10,000	10-10,000

Notes: 1. Relative rating, from 1 (best) to 5 (worst). For example, die casting has relatively low porosity, mid to low shape complexity, high dimensional accuracy, high equipment and die costs, and low labor costs. These ratings are only general; significant variations can occur, depending on the manufacturing methods used. 2. Approximate values without the use of rapid prototyping technologies. Minimum quantity is 1 when applying rapid prototyping. Source: Data taken from J.A. Schey, *Introduction to Manufacturing Processes*, 3d ed., McGraw-Hill, 2000.